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ABSTRACT

This publication consists of a lengthy list of environmental games (35) on the market today, their source and purchase price. Included is a description of the major changes the types of games have undergone. The first group of games resembled closely ordinary board games with success dependent on skill and/or chance rather than understanding of the subject matter. The "second generation" attempted to simulate reality more closely and decreased the role of chance. The latest group of games are simulations which attempt to replicate a simplified reality. Also included are several suggestions for the teacher who wishes to utilize environmental games. (BB)

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ENVIRONMENTAL GAMES AND SIMULATIONS

Compiled by Tom Eckman

A LITTLE HISTORY AND FEW SUGGESTIONS: Included in many definitions of Environmental Education are such terms as "problem solving," "student centered," and "relevant." While these terms may or may not correctly express or adequately depict what Environmental Education is, they do share a high positive correlation with any definition of environmental games or simulations. While not a recent entrant to the teaching arts, simulations and gaming have only recently "arrived" in full force, game boards in hand. Their sudden appearance has provoked considerable skepticism on the part of some teachers and administrators and many parents who feel "Johnny can play monopoly at home." Much of this mild furor developed as a result of what is/was the evolutionary pattern of simulations and gaming.

The majority of games produced in the "first generation" resembled quite closely many of the popular parlor games with dice, game boards, funny money, spinners, etc., being utilized to convey certain concepts or generalizations. Many of these games made no attempt to replicate real world behavior. Moreover, a participant's success was dependent upon skill or chance or some combination of the two and not, rather, on his understanding of the subject matter. This latter characteristic is what evoked much of the criticism and ultimately led to the development of a second generation of games.

Although the major feature of gaming, that of interaction (competition) among participants to achieve a pre-specified goal remained intact, the second generation of games attempted to simulate reality more closely and decrease the role of chance in determining the outcome of the game. It was at this point in the evolutionary history of gaming that many of the first environmental games were created. "Pollution," "Smog," "Dirty Water" and "Population" are games which were among the original line-up of environmental games and they are fair representatives of this "second generation."

While gaming was undergoing its transformation, a parallel evolution was taking place in the form of simulations. These differed from games in that from the outset they attempted to replicate a simplified reality. That is, their objective was to replicate essential aspects of reality so that it might be better understood and/or controlled. To accomplish this, situations were created which depicted existing conditions and problems presented to participants who then take the roles of decision makers to solve the problems. This simple formula has resulted in a varitable host of simulations, some of which concern environmental problems. "Balance," "Pressure," "Planet Management," "The Redwood Controversy," "Open Space" and "Sacrifice" are few examples of the many simulations available for environmental education.

Cross fertilization of simulations and gaming has resulted in a group of valuable hybrids. These include such simulation games as "Land Use," "New Town," The Coca Cola game, and "Extinction" which utilize both a modified game board (for planning or as graphic representation of a real system) and role-playing and decision-making to convey their ecological and environmental content.

All three categories have their place in the classroom since each focuses upon different kinds of learning activities and fosters correspondingly different

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learning outcomes. The simulations, while the most robust and adaptable, require a certain degree of sophistication on the part of the student that most of the games do not. The games allow a high level of competition to serve as a motivating force, whereas the simulations in general emphasize group cooperation and consensus. The list of differences is lengthy and each teacher should consider his or her objectives before introducing a particular type of game into a program.

SUGGESTIONS:

1. If you discover a simulation or game you feel suits your needs, before you attempt to introduce it into the classroom, play it with a group of adults or a few of the class members. You will find it much more expedient and simpler to introduce a game you have played than to explain the rules to an entire class while both of you learn how to play.

2. Simulations are designed to be open-ended so allow your students to make their own decisions based upon their own values and biases.

3. In most cases, reality is depicted fairly accurately in the simulations. Discussion, however, should follow the completion of all of them to clear up any misunderstandings or misconceptions the students might have gained as a result of the limitations of the simulation or game.

BALANCE: A simulation with players taking roles of members of community involved in ecological issues. Families choose between economic-social values necessary for a family to function and ecological values necessary for our physical environment to survive. Although designed for secondary students, with adaptation it can be used in biology, English and social studies classes, grades five through college. Teacher's guide contains a "three hour version" but ideally more time should be allotted so that students may perform the outside research necessary to support their decisions. $10.00, Interact, P.O. Box 262, Lakeside, California 92040.

PRESSURE: Players become members of one of six pressure groups which can and do exist in most American communities. The history of settlement, zoning decisions, ethic background and the cities financial situation is provided to help the students solve problems that confront today's typical American cities. Suitable for junior high and above and requires two to three weeks in one hour periods. Price $10.00, Interact, P.O. Box 262, Lakeside, California 92040.

COPE: A simulation in which students become residents of a future city during five different time periods, each separated by ten years of "progress." The simulation encourages students to think of alternative futures, evaluate new forms of technology, learn a new language and cope with the pace of change. Junior high and above. Time required ranges from two to three weeks in one hour periods. $10.00, Interact, P.O. Box 262, Lakeside, California 92040.

DIRTY WATER: Each player is the water pollution commissioner of an industry surrounded lake. He travels around the game board to build up organisms in his lake in a food pyramid. Organisms are occasionally destroyed by pollution from which he can only gain relief by purchasing "Pollution Abatement" cards. Generally takes two to three class periods to complete. Cost $10.00. Urban Systems, Inc.,1033 Massachusetts Avenue, Cambridge, Mass. 02138.

ECOLOGY: The Game of Man and Nature - The game involves players achieving a balance between man's activities and the natural environment, while traveling through the four ages of development: hunting, agricultural, industrial and environmental. Designed for 2-4 players from upper level grade school through high school. Time required varies greatly, but can usually be completed in two to three class periods. $10.00. Urban Systems, Inc., 1038 Massachusetts Avenue, Cambridge, Mass. 02138.

EXTINCTION: A simulation board game for 2 to 8 players. The game deals with some of the key processes by which species survive and evolve, or become extinct: reproduction, migration, mortality, competition, predation, and genetic change. It also illustrates the complex and sometimes devastating chain reactions which may be started by changes in the environment, particularly those caused by man. The rules booklet and teacher's guide discusses the game vs nature and suggests several alternative versions for advanced players. Play ends when all but one species becomes extinct which usually requires three hours or longer. Shorter games can be played by establishing a time limit and scoring system. Junior high through adult. $11.95. Sinauer Associates Inc., 20 Second Street, Stamford, Conn. 06905.

LAND USE: This simulation game brings out the conflict between the desire for quality housing and the desire for natural resources. In developing the

land, groups of participants have the opportunity as planners to discover how they might "blend" with the land and use it with the least possible harm to the environment. Concepts include cluster zoning and planned unit development. Game can be used in conjunction with the book, Mike's World - Your World (same publisher as game). Designed for upper elementary through adult, the packet includes five identical planning packets, each one suitable for a group of two to six planners. Game requires less than 45 minutes to complete, but the ensuing discussion can be lengthy. $1.95. Educational Ventures, 209 Court Street, Middleton, Connecticut. 06457.

LITTERBUG: Players move around a cute board collecting litter in tiny trash barrels to keep the community clean and free of litter. Created for two to four players and suited to pre-school and primary grades. $5.00. Urban Systems, 1038 Massachusetts Ave., Cambridge, Mass. 02138.

MAN IN HIS ENVIRONMENT: Not a game in that there is no specific point of completion, but instead two separate activities requesting the students to role play. The first exercise, Rescue in Space, helps the participants understand that we live in an environment whose resources are limited. The second exercise, Make Your Own World, emphasizes man's interdependence with his environment. Both exercises involve the whole class (10-60 students) and can be played by grades four and up. Both exercises can be adapted to fit almost any time period ranging from 20 minutes to several days. Free to educators from local Coca-Cola Bottling Company. Ecology Kit Code X013.

PLANT MANAGEMENT GAME: A computer designed simulation of existing conditions on a fictitious planet "Clarion". Players make management decisions involving population, income, food and the environment in an attempt to improve the quality of life for the planet's inhabitants. Considered to be one of the most accurate simulations portraying existing conditions on earth. Designed for five individuals or groups although one can play as easily as a whole class. High school through adult. List price $16.00, school price $12.00. Houghton Mifflin, Co., 110 Tremont Street, Dept. M., Boston, Mass. 02107.

THE POLLUTION GAME: An environmental monopoly game, it allows students to simulate the progressive contamination of our environment. The players take roles of influential citizens, make decisions, and initiate actions for pollution abatement to keep their air and water pollution levels below the "lethal limit". Designed for competing teams of four members each and multiples thereof. Suitable for upper elementary and above, the game can generally be completed in one class period. List price $12.00, school price $9.00. Houghton Mifflin Company, 110 Tremont St., Department M, Boston, Mass. 02107.

ECOPOLIS: A simulation designed to introduce the student to the concepts of ecosystems, overpopulation, and land use planning. The major question considered is, "Is growth progress?" Students take roles of citizens in a community struggling to solve ecological problems such as overpopulation and land development. Outside projects related to the activity encourage action against local pollution problems. Suitable for junior high and above and requires several periods to complete to allow students time for outside research. Price $10.00. Interact, P.O. Box 262, Lakeside, California 92040.

POPULATION: The game is played by two to six players, each representing a country. Each player begins the game with a limited amount of money, a small population and agriculture adequate enough to feed his population. He must acquire resources to develop his country to the fullest potential possible and control its growth so that his population does not outgrow the limits of his country's space and available resources. Suitable for high school and above and takes two to three class periods to play, although completion of the game is not necessary to learn the concepts involved. $10.00. Urban Systems, 1033 Massachusetts Ave., Cambridge, Massachusetts 02138.

THE REDWOOD CONTROVERSY: A role-playing simulation based upon an actual case study. Designed to help students understand the conflicting ecological, sociological and political issues involved in environmental planning. Students play the roles of Senators and Senate witnesses in a simulation of the events that preceded the Senate vote on the establishment of the Redwoods National Park. Twenty-one students are given specific roles, others are senators. Thirty can play. Duration of play depends upon the sophistication of the participants. Appropriate for social studies, speech, or debate at the secondary level and beyond. List price $10.00, school price $7.00. Houghton Mifflin Co., Dept. M. 110 Tremont St., Boston, Massachusetts 02107.

SMOG: Players assume the role of an elected official in his town who is responsible for managing the quality of the air. He confronts the problems of air pollution control as he moves along a "decision tree", making decisions which affect his financial status, popularity and the growth of his town, as well as the air quality. Two to four people can play. Game can be completed in one to two class periods. Best suited for high school, although if rules of play can be interpreted, upper elementary students could handle it. $10.00 Urban Systems, Inc., 1033 Massachusetts Ave., Cambridge, Mass. 02138.

INDIAN VALLEY: Students put into practice some of the principles which professional forest managers employ. Students divide into six teams representing a different interest in forest land use with one representing a multiple use committee. Teams decide what to do with the forest and present their plans to the committee. An open-ended game with no single "correct" prescription for management of a given area of forest land. The purpose is to give students a sense of awareness of the problems and conflicts that exist in land management, and the opportunities for increasing the range of values from the land while preserving the forest environment. Game kit includes a map, 1 set of directions for each team, sheets for scoring, and directions for the teacher. High school and above. Length of play can be extended over several class periods to allow for team planning and research. Single copies free from American Forest Institute, 1619 Massachusetts Ave., N.W., Washington, D.C. 20036.

PREDATOR-PREY: An exciting simulation game for teaching/learning about food chains, food webs, predator-prey relationships and cycles. Each player tries to be the best predator possible and the traces (graphs) the changes in the predator and prey populations under a variety of circumstances. Excellent teachers guide. May be utilized individually or by an entire class. Upper elementary through adult. $6.00. Urban Systems, Inc., 1033 Massachusetts Ave., Cambridge, Mass. 02138.

THE DIRTY OLD GAME OF POLLUTION: Players advance along a trail gaining extra spaces by landing on sound environmental practices and receive penalties for unsound (polluting) practices. Movement is made by spinning an arrow. Pre-school and primary grades. Free from Northwest Public Power Association. Vancouver, Washington 98660.

NO TIME TO WASTE: Multi-media kit with eleven lessons. Lesson seven is a card game. The rummy-type card game is designed to reinforce the students' knowledge of the cycle of life. It contains cards representing the natural environment (all the things a plant needs to grow: sun, water, soil), plants, herbivors, carnivors (in the game represented by a lion), and decomposers. There are also pollution cards. The rules describe three different chains of cards that can be built up. The longer the chain a student gets, the more points he wins. Pollution cards can be used to destroy a chain. There are four packs of cards in the kit. Each deck is suitable for three to five players. Suitable for grades four to seven, the card game lasts between one-half hour and 45 minutes. Price for Teachers Kit, $7.50 plus 35¢ for each student workbook. Continental Can Company, Inc., Office of Environmental Affairs, 633 3rd Avenue, New York, New York, 10017. Attention: Mr. S. V. Hudson.

RECYCLING RESOURCES: Multi-media kit with nine lessons. Lesson six is a role-playing simulation game. In the game, "ecopolis" as mayor and as manufacturers of goods, players discover that things are not always as simple as they seem to be on the surface. In making decisions about what they will do with their wastes, the students discover the economic and social cost of pollution. If the students decide that the costs are too high, they can vote to change the rules of the game and try to improve the situation. There are materials in the kit for four groups of students to play the game simultaneously. Five to nine students can play with the optimum being seven. At least two groups should be playing at the same time. This is essential, for players are not competing against the others in their group, but against the players with the same role in the other groups. Intermediate through junior high grades. Game can be completed in a single class period. Complete kit $12.50 plus 35¢ per student workbook. Continental Can Company, Inc. Office of Environmental Affairs, 633 3rd Avenue. New York, New York 10017.

SURVIVAL KIT: ECOLOGY & SOCIAL ACTION: Part of this mixed-media kit is the simulation, Who Plans Sunny Acres, which is a series of games about conflict and group interest. Often we hear people, "What difference will it make if I stop using detergents?" or "In a country this big, nobody would even notice the amount of pollution that comes from my car." The same situation arises for a housing developer with an eye on a beautiful tract of unspoiled land. Students play in teams of four, they compete against all other students in the classroom for the highest cash income. Designed for use by high school social studies classes, the game can be completed within a single period provided the rules are explained beforehand. Complete kit is $50.00. Harper & Row Publishers, Inc., School Dept. Attention: Kenneth L. Propst. 15103 S.E. 22nd St., Bellevue, Washington 98007. Phone 206-746-1945.

WILDLIFE: The object of the game is to capture and purchase wild animals in an effort to fill one of four great zoos. The first player to fill all 12 sections of his zoo is declared the winner. Three to five players. Preschool and primary grades. The game dramatizes the life of annimal preservers (as compared to big game hunters). Although it can provide a background for children seeking wider knowledge of the animal kingdom, it does not cover such concerns as the animals lost in capture nor the conditions in the zoos. Duration is less than a single class period. $7.50. E.S. Lowe Co., Inc. New York, N.Y. 10010.

PROPAGANDA: While not specifically an environmental game, the skills taught by it are essential for all citizens to function well in today's society. The ability to recognize various propaganda techniques utilized by both sides on an environmental issue would greatly enhance the probability of a better decision being made. Although designed for two to four players, more can play as members of teams. After reviewing various techniques of propaganda the participants are given examples of these techniques and asked to identify them. Secondary level and above. Depending upon the previous knowledge and sophistication of the players, the game requires between one to three class periods to play, although no specific point of completion is necessary to understand the concepts involved. $6.00 plus 50¢ postage and handling. WFF'N'Proof, Box 71, New Haven, Conn. 06501.

CLEAN-UP: The object of Clean-up is to collect trash and to help keep a town beautiful by planting trees, grass and flowers and by providing trash cans for litter. Players must first put together a playing field, then hop or walk around it replacing Trash Cards with Beauty Cards. The first player to play all his Beauty Cards is the winner, because he has been the most helpful in cleaning up the trash and creating a beautiful town. Game requires less than 30 minutes to complete. Two to six players, ages 4-10. $5.00, Urban Systems, Inc., 1033 Massachusetts Ave., Cambridge, Mass. 02138.

INTER-DEPENDENCE: A GAME OF ECOLOGICAL RELATIONSHIPS: Game attempts to demonstrate the relationships that exist among natural things. The object of the game is to create relationships which are true by using series of noun and verb cards. The nouns (represented by round cards) depict living or non-living natural objects, e.g. "sun". The verbs (represented by connecting arrows) depict relationships, e.g. "eats". Now out of print, but plans can be obtained from Tom Eckman at Cispus Environmental Center. Excellent for teaching both ecology and English. Suitable for intermediate levels through junior high. Can be completed easily within a single class period.

ENVIRONMENTAL BALANCE: Although essentially simulation for environmental value clarification, it can be utilized to promote research on current events on a variety of different topics. Four players or teams attempt to keep their ecosystems in balance while they move toward the finish. They must control three variables (abiotic, biotic, and cultural) simultaneously to remain in balance. If their system is unbalanced they must attempt to restore balance by use of "crisis cards" which are developed prior to the game from actual environmental disasters which resulted when one of the three variables was altered. Suitable for high school and adult. Requires before game, out-of-class research and in-class discussion consequently duration of play varies greatly with sophistication of class. Plans available from Tom Eckman at Cispus Environmental Center.

THE GAME OF SACRIFICE: An environmental conflict simulation that divides the class into the kinds of interest groups that make up a real community. Acting on the basis of their own values and attitudes, these groups attempt to reach consensus on the "right" solution to environmental problems which concern the entire community. No group is made up of "bad guys". All want to solve the problems raised in five successive rounds; industrial water pollution, bottle and tin can recycling, downtown traffic jams, expansion of electrical power production and the use of conservation funds. The game includes materials for ten groups to play five rounds. A four-page teacher's guide offers extensive suggestions for procedure and round-by-round discussion as well as ideas for associated research, reports, and creative audio-visual efforts by students to

improve communication among groups. Designed to be played over several class periods by 10-100 players at the secondary level and beyond. Price $4.95. Education Ventures, Inc., 209 Court Street, Middletown, Conn. 06457.

ENVIRONMENTAL ATTITUDE: A survey to help students examine group attitudes, discuss issues and learn social science skills of polling and data analysis. A four-page teaching guide describes methods of developing analysis and discussion, plus ways of using the game to cross-tabulate the survey in terms of boy-girl, adult-child, neighborhood-neighborhood responses (or to conduct the survey partially or wholly in the community). Although only three questions are provided in the kit, a multitude of other questions can be developed by the students themselves. Suitable for upper elementary through high school. Depending upon discussion, game can last from one to two periods. Price $3.75. Education Ventures, Inc., 209 Court Street, Middletown, Conn. 06457.

OUTDOOR SURVIVAL: A Game of Wilderness Skills: An all-age challenge that teaches outdoor basics as it is played. Dozens of real-life situations are in the five basic games - LOST, SURVIVAL, SEARCH, RESCUE AND PURSUE. For 2, 3, or 4 players or teams. It sharpens whatever skills anyone may have or pinpoints tips to be remembered. Large foldout game board represents 13,200 square miles of woods, rough terrain, mountains, plains, rivers and lakes. Full scenario cards for each of the five basic games allow player adaptation limited only to the depth of imagination. Price $10.00. Cameron & Keller, Harrisburg, Pa. 17105. NOTE: This game is not considered an environmental simulation. However, since great masses of people are verturing into the "wilderness" many of whom are unprepared to meet the unique conditions there, this game was added for the advancement of safety to those going "back-to-nature" in the belief that a positive experience there can only make them allies to the environmental cause.

NEW TOWN: Up to four players or teams buy land, build factories, homes, stores, vote on parks, schools, parking lots, and experience business booms, fires, floods, and pollution fines. Objectives of the simulation depends upon the level at which it is used with increasing sophistication from junior high through adult. Game requires between one and four hours to complete, again depending upon grade level and can accommodate between three and ten individuals or teams. $16.00. Harwell Associates, Box 95, Convent Station, N.J. 07961.

PEACEFUL VALLEY: A simulation on citizen action developed by Janet Woerner. An electric company is going to build a large coal-burning plant next to a chemical company. The chemical company is going to double its capacity as a result. The town council is called into session to discuss the new industries and the current air pollution problem of Peaceful Valley. Students take roles as typical members of the community. Secondary level and suitable for an average class size. Free from Janet Woerner, Freeland High School, 710 Powley Drive, Freeland, Michigan 48623.

THE GARBAGE GAME: An action game to remind students that the problems of saving the environment start at home. The Garbage can contains 128 jigsaw pieces which make seven cartoons about household waste and how to diminish them. From two to six players strive to complete the cartoons for a high score. In the process, they are governed by ecological principles. Pressure packed "greed" rounds

permit them to take as many pieces as they can grab but they are penalized if they take more than they can use constructively. A spinner governs the give and take of the game and the chance to "recycle" materials from the Garbage container. A Household Ecology Checklist accompanies the game rules. Intermediate grades through adult will enjoy and learn from this game. Playable in a class period. Price $7.00. Educational Ventures, Inc., 209 Court Street, Middletown, Conn. 06457.

OPEN SPACE: Farm Hills in Newtown's last big parcel of undeveloped land. A developer's proposal to build a huge shopping center at Farm Hills stirs public debate about how the land could best be used. Some members of a slum area neighborhood group think Farm HIlls would make a good site for low cost public housing. A group of parents favor using it as a family recreation area. Some local businessmen see Farm Hills as the perfect location for a badly needed industrial park. An environmental group argues that the land will be most valuable to the community as a totally undeveloped open space. The debate culminates at a public hearing. Junior high through adult. 12 to 60 players. Ideally the play should last over several periods allowing time for research, planning and politicking. Price $4.95. Educational Ventures, Inc., 209 Court Street, Middletown, Conn. 06457.

MIKE'S WORLD - YOUR WORLD: A unit designed to help students see problems of environmental abuse in relationship to their own comforts and conveniences and discover more about their personal responsibilities to the world. The unit includes a six-page teaching guide to accompany the text and pre-test, post-test designed to help students measure and document water, air, noise and visual pollution in their own community. To be used in conjunction with Land Use, a simulation on planning a housing development. (See description on page 3) Price 75¢ per copy and teachers guide 50¢ per copy. Educational Ventures, Inc., 209 Court St., Middletown, Conn. 06457.

POLLUTION: Negotiating a Clean Environment: Four players (or teams of players) each representing a different power role - business and industry, state government, citizens and conservationists - negotiate to obtain the best possible environment and quality of life while still gaining the satisfaction of obtaining personal or corporate goals. To stimulate negotiation among these players, a number of "issues" are considered one at a time in a series of negotiation sessions. Voting takes place after each negotiation session on the likelihood of the event being supported, allowed to continue, or opposed. The exercise may be conducted simultaneously with several groups in the same classroom. Grades 7-12 and adult with groups of virtually any size capable of being accommodated. Requires several periods to complete the entire game, however, portions may be played within a single class period. $22.50 Instructional Development Corporation. P.O. Box 805, Salem, Oregon 97304.